

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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February 29, 2008	/Tait R. Swanson/
Date	Tait R. Swanson
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**AMENDED APPEAL BRIEF
PURSUANT TO 37 C.F.R §§ 41.31 AND 41.37,
AND RESPONSE TO NOTICE OF DEFECTIVE BRIEF**

This Amended Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on June 13, 2007, and received by the Patent Office on June 15, 2007. This Appeal Brief was originally submitted on December 17, 2007; however, it has been amended to correct the alleged defects indicated by the Examiner in the Action mailed January 31, 2008. Appellants stress that no fees are currently due in association with this Amended Appeal Brief. Appellants previously paid the requisite fee of \$510.00 for the original Appeal Brief as well as the four-month extension fee of \$1,640 on June 13, 2007. However, if any fees are deemed necessary to advance the present appeal, then Appellants authorize the Commissioner to charge such fees to Deposit Account No. 03-0335; Order No. OTD-030414 US.

1. **REAL PARTY IN INTEREST**

The real party in interest is Cameron International Corp., the Assignee of the above-referenced application by virtue of the assignment record at Reel:014516; Frame: 0610.

Cameron International Corp., the Assignee of the above-referenced application, as evidenced by the documents mentioned above, will be directly affected by the Board's decision in the pending Appeal.

2. **RELATED APPEALS AND INTERFERENCES**

Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellants' legal representative in this Appeal.

3. **STATUS OF CLAIMS**

Claims 5-8, 12-16, and 19-28 are currently pending, have been twice rejected, and are the subject of this Appeal. Of the above-listed claims, claims 5, 19 and 28 are independent claims.

Claims 1-4, 9-11, 17 and 18 have been previously cancelled without prejudice.

4. **STATUS OF AMENDMENTS**

All amendments in relation to the claims of the present application have been entered, and no amendments have been submitted or entered subsequent to the Office Action mailed on January 19, 2007.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

In accordance with certain embodiments, the claimed subject matter relates to a seal assembly capable of low-temperature service. Pursuant to 37 C.F.R. § 41.37(v), Appellants provide the following summary of the claimed subject matter. Appellants have, to the extent possible, provided reference numerals with associated components.

In a general sense, the present application, in accordance with certain embodiments, describes a seal assembly designed to seal an annular gap between two bodies. This seal assembly has a seal body 10 and metallic backup rings 12 and 14 on the upper and lower ends of the seal body 10.

Advantageously, this exemplary seal assembly includes certain features that provide mitigation against seal extrusion in cold temperatures, for instance. In particular, Fig. 1 illustrates that the backup ring 12 includes looped ends 16 and 18 that are outwardly biased by an inflected portion 22 located therebetween. These backup rings prevent extrusion of the seal material because the looped ends are biased outward to ensure continual contact between the backup rings and the surfaces to be sealed.

Additionally, to facilitate greater seal functionality in low-temperature settings, the exemplary seal assembly comprises seal rings 28 and 36 installed into grooves 24 and 32, and seal rings 30 and 38 disposed in grooves 26 and 34. These seal rings and grooves are dimensioned such that a net radial force is applied to the seal body by the seal rings, thus pre-loading the backup rings 12 and 14 to further prevent seal extrusion. Put differently, the seal rings radially compress but axially expand the seal body 10, causing the seal body to further bias the bends 16 and 18 outwardly.

Claim 5

Claim 5 recites, in its preamble, “[a] seal assembly for closing off an annular space between a first and second body supported by at least one of said first and second bodies.” An example of such an assembly is illustrated in Fig. 1 of the present application and described in ¶¶ [0007, 0010], which describe that the claimed seal assembly is designed to close an annular gap between the outer and inner surfaces of two bodies. For example, ¶ [0007], ll. 15-17 describes that the seal assembly’s “ends 16 and 18 are forced into an interference fit in the annular gap in which the seal is disposed.” Moreover, ¶ [0007], ll. 17-21 describe that ends 16, 18 of the seal assembly are pushed “away from each other and into contact with the annular space the seal assembly is intended to close.”

Turning to the body of this claim, it recites an “annularly shaped body having an upper and a lower end and a longitudinal axis.” An exemplary element encompassed by this limitation is represented by seal body 10 introduced in ¶ [0007], l. 2, which states that “[t]he

seal has a body 10.” For instance, the above-referenced paragraph and figure describe an annularly shaped body (10) that has an upper end (towards numeral 12) and a lower end (towards numeral 14) and longitudinal axis.

Claim 5 also recites

at least one backup ring mounted on one of said ends of said body and having a relaxed dimension greater than the annular space between said first and second bodies so that opposed ends on said backup ring must be compressed to be inserted in the annular space, said backup ring further comprising a bend between said opposed ends to store a force created by insertion of said backup ring into the annular space and apply said force on said opposed ends against said first and second bodies.

The exemplary rings 12 and 14 described in ¶ [0007] of the present application are representative of the above-quoted claim limitation. As illustrated, the at least one back up rings (12), (14) are disposed on the body (10). Specifically, ll. 2-3 state that “[t]he seal has a body 10 and an upper backup ring 12 and a lower backup ring 14.” The exemplary rings 12, 14 have a relaxed dimension that is greater than the annular space between the first and second bodies, as is claimed and as is exemplified by ¶ [0007], ll. 18-21, which states that “[t]his spring effect pushes the ends 16 and 18 away from each other and into contact with the opposing walls that define the annular space.” The exemplary ring 12 “has a bend 22 that absorbs and stores a force as ends 16 and 18 are pushed into the interference fit of the annular space,” as is described in ¶ [0007], ll. 14-17. Moreover, as described in ¶ [0007] ll. 21-23, “[i]n installation of the ring 12 into the annular space causes it to elastically deform while transferring potential energy into bend 22.”

Claim 5 next recites that “said body comprises at least one first ring in a first groove, said first groove having a bottom and a first circumference at said bottom.” The present application, as an exemplary embodiment, describes in ¶ [0008], ll. 5-9 grooves 24 and 26 in the body 10 that support ring seals 28 and 30, and grooves 32 and 34 that support seals 36 and 38. As illustrated in Fig. 1, each of these grooves has a bottom, and that bottom defines a circumference of the annular grooves.

Claim 5 next recites that “the circumference of said first ring at a location nearest said first circumference of said first groove differs before mounting from said first circumference of said first groove so as to apply a net radial force to said body in a direction substantially perpendicular to said longitudinal axis.” In the present application, ¶ [0010] describes the dimensional relationship between these grooves and the corresponding seal rings that reside within the grooves. Specifically, this section states that

With regard to inside diameter rings 28 and 36, it is preferred that they be sized so that they are circumferentially compressed when installed into their respective grooves 24 and 32. A circumferential compression in the range of about 8-15% of the relaxed circumference is preferred.... This is achieved by making the circumference of rings 28 and 36 about 8-15% longer than the groove into which it is to be mounted. The larger the oversize, with the rings still in their respective grooves, the greater is the force against backup rings 12 and 14 and, in turn the greater is the stored force in rings 12 and 14 to force the ends, such as 16 and 18 against the inner and outer surfaces that define the annular gap that the seal assembly is meant to close.... When rings 28 and 36 are installed and in contact with the inside diameter the circumferential compression results in an axial wave pattern occurring in the respective groove as well as some pushing of the grooves 24 and 32 toward grooves 26 and 34 respectively. This wave deformation in the axial direction along the circumference puts an additional axial force against rings 12 and 14 to cause their respective ends, such as 16 and 18 to splay apart for better contact with the walls that define the inner and outer surfaces to be sealed by the seal assembly.

Put differently, the rings 28, 30, 36 and 38 are dimensioned such that they apply, for example, an inwardly directed radial force on the seal body 10. This can be accomplished, as discussed above, by dimensioning rings 28 and 36 so that they have a circumference that is slightly larger than the circumference of the grooves 24, 32 in which they sit; and rings 30 and 38 can have a circumference that is slightly smaller than the circumference of the grooves 26 and 34.

Claim 19

Claim 19, in its preamble, recites “[a] seal assembly for closing off an annular space between a first and second body and supported by at least one of said first and second bodies.” An example of such an assembly is illustrated in Fig. 1 of the present application and described in ¶¶ [0007, 0010], which describe that the claimed seal assembly is designed to close an annular gap between the outer and inner surfaces of two bodies. For example, ¶ [0007], ll. 15-17 describes that the seal assembly’s “ends 16 and 18 are forced into an interference fit in the annular gap in which the seal is disposed.” Moreover, ¶ [0007], ll. 17-21 describe that ends 16, 18 of the seal assembly are pushed “away from each other and into contact with the annular space the seal assembly is intended to close.”

Turning to the body of this claim, it begins by reciting “an annularly shaped body having an upper and a lower end and a longitudinal axis.” An exemplary element encompassed by this limitation is represented by seal body 10 introduced in ¶ [0007]. For instance, the above-referenced section describes an annularly shaped body (10) that has an upper end (towards numeral 12) and a lower end (towards numeral 14) and longitudinal axis.

This claim also recites that the body “comprises at least one first ring in a first groove, said first groove having a bottom and a first circumference at said bottom.” The present application, as an exemplary embodiment, describes in ¶ [0008], ll. 5-9 grooves 24 and 26 in the body 10 that support ring seals 28 and 30, and grooves 32 and 34 that support seals 36 and 38. As illustrated in Fig. 1, each of these grooves has a bottom, and that bottom defines a circumference of the annular grooves.

This claim also recites that “the circumference of said first ring at a location nearest said first circumference of said first groove differs before mounting from said first circumference of said first groove so as to apply a net radial force to said body in a direction substantially perpendicular to said longitudinal axis.” In the present application, ¶ [0010] describes the dimensional relationship between these grooves and the corresponding seal rings that reside within the grooves. Specifically, this section states that

With regard to inside diameter rings 28 and 36, it is preferred that they be sized so that they are circumferentially compressed when installed into their respective grooves 24 and 32. A circumferential compression in the range of about 8-15% of the relaxed circumference is preferred.... This is achieved by making the circumference of rings 28 and 36 about 8-15% longer than the groove into which it is to be mounted. The larger the oversize, with the rings still in their respective grooves, the greater is the force against backup rings 12 and 14 and, in turn the greater is the stored force in rings 12 and 14 to force the ends, such as 16 and 18 against the inner and outer surfaces that define the annular gap that the seal assembly is meant to close.... When rings 28 and 36 are installed and in contact with the inside diameter the circumferential compression results in an axial wave pattern occurring in the respective groove as well as some pushing of the grooves 24 and 32 toward grooves 26 and 34 respectively. This wave deformation in the axial direction along the circumference puts an additional axial force against rings 12 and 14 to cause their respective ends, such as 16 and 18 to splay apart for better contact with the walls that define the inner and outer surfaces to be sealed by the seal assembly.

Put differently, the rings 28, 30, 36 and 38 are dimensioned such that they apply, for example, an inwardly directed radial force on the seal body 10. This can be accomplished, as described above, by dimensioning rings 28 and 36 so that they have a circumference that is slightly larger than the circumference of the grooves 24, 32 in which they sit; and rings 30 and 38 can have a circumference that is slightly smaller than the circumference of the grooves 26 and 34. This dimensional relationship, for example, provides against extrusion of the seal assembly during low- or cold- temperature conditions, for example, by further biasing rings 12 and 14 outwardly, as mentioned ¶ [0005] of the application.

Claim 28

Claim 28, in its preamble, recites “[a] seal assembly for sealing an annular space between first and second bodies.” An example of such an assembly is illustrated in Fig. 1 of the present application and described in ¶¶ [0007, 0010], which describe that the claimed seal assembly is designed to close an annular gap between the outer and inner surfaces of two bodies. For example, ¶ [0007], ll. 15-17 describes that the seal assembly’s “ends 16 and 18

are forced into an interference fit in the annular gap in which the seal is disposed.” Moreover, ¶ [0007], ll. 17-21 describe that ends 16, 18 of the seal assembly are pushed “away from each other and into contact with the annular space the seal assembly is intended to close.”

Turning to the body of this claim, it recites “an annularly shaped body having first and second ends, and at least one notched portion disposed between the first and second ends.” An exemplary element encompassed by this limitation is represented by seal body 10 introduced in ¶ [0007]. For instance, the above-referenced section describes an annularly shaped body (10) that has an upper end (towards numeral 12) and a lower end (towards numeral 14) and longitudinal axis. Moreover, the present application, as an exemplary embodiment, describes in ¶ [0008], ll. 5-9 grooves 24, 26, 32 and 34 that are representative of the notched portions claimed and that are located between the ends of the body 10.

This claim also recites “at least one backup ring disposed on one of the first or second ends.” The exemplary rings 12 and 14 described in ¶ [0007] of the present application are representative of the above-quoted claim limitation. As illustrated, the at least one back up rings (12), (14) are disposed on the body (10). Specifically, ¶ [0007], ll. 2-3 state that “[t]he seal has a body 10 and an upper backup ring 12 and a lower backup ring 14.”

Claim 28 also recites that backup rings comprise “a pair of loop ends extending toward the annularly shaped body and configured to secure the backup ring to the annularly shaped body.” As illustrated in Fig. 1 and described in ¶ [0007], ll. 8-10, the “[r]ing 12 features inwardly looping ends 16 and 18 that can be snapped onto the body 10 in a gripping engagement that can be snapped onto the body.”

Claim 28 also recites that backup rings comprise “an inflected portion located between the loop ends and in abutment with the annularly shaped body, wherein the inflected portion facilitates elastic deformation of the backup ring.” As illustrated, these backup rings 12 and

14 comprise a bend 22 that acts as a spring that biases ends 16 and 18 into an interference fit against the bodies defining the annular space, as is claimed and as is exemplified by ¶ [0007], ll. 18-21, which states that “[t]his spring effect pushes the ends 16 and 18 away from each other and into contact with the opposing walls that define the annular space.” The exemplary ring 12 “has a bend 22 that absorbs and stores a force as ends 16 and 18 are pushed into the interference fit of the annular space,” as is described in ¶ [0007], ll. 14-17. Moreover, ¶ [0007], ll. 21-23 state that “[i]n installation of the ring 12 into the annular space causes it to elastically deform while transferring potential energy into bend 22.”

Claim 28 also recites “a sealing ring disposed in the notched portion of the annular body and configured to provide a biasing force in a radially inward direction with respect to the annular body.” In the present application, ¶ [0010] describes the dimensional relationship between these grooves and the corresponding seal rings that reside within the grooves. Specifically, this section states that

With regard to inside diameter rings 28 and 36, it is preferred that they be sized so that they are circumferentially compressed when installed into their respective grooves 24 and 32. A circumferential compression in the range of about 8-15% of the relaxed circumference is preferred.... This is achieved by making the circumference of rings 28 and 36 about 8-15% longer than the groove into which it is to be mounted. The larger the oversize, with the rings still in their respective grooves, the greater is the force against backup rings 12 and 14 and, in turn the greater is the stored force in rings 12 and 14 to force the ends, such as 16 and 18 against the inner and outer surfaces that define the annular gap that the seal assembly is meant to close.... When rings 28 and 36 are installed and in contact with the inside diameter the circumferential compression results in an axial wave pattern occurring in the respective groove as well as some pushing of the grooves 24 and 32 toward grooves 26 and 34 respectively. This wave deformation in the axial direction along the circumference puts an additional axial force against rings 12 and 14 to cause their respective ends, such as 16 and 18 to splay apart for better contact with the walls that define the inner and outer surfaces to be sealed by the seal assembly.

Put differently, the rings 28, 30, 36 and 38 are dimensioned such that they apply, for example, an inwardly directed radial force on the seal body 10. This can be accomplished by dimensioning rings 28 and 36 so that they have a circumference that is slightly larger than the circumference of the grooves 24, 32 in which they sit; and rings 30 and 38 can have a circumference that is slightly smaller than the circumference of the grooves 26 and 34. This dimensional relationship, for example, provides against extrusion of the seal assembly during low- or cold- temperature conditions, for example, by further biasing rings 12 and 14 outwardly.

Appellants respectfully submit that the foregoing embodiments are representative of the subject matter respectively recited in independent claims 5, 19, and 28 of the present application, as well as certain dependant claims of the application.

Claim 20

Claim 20, and its respective claims, recite that “the first ring circumference is in the range of at least about 8-15% different from said groove in which it is installed.” By way of example, this specific dimensioning of the seal ring 28 with respect its groove 32, for instance, is described at ¶ [0010], ll. 5-10, which state “A circumferential compression in the range of about 8-15.1% of the relaxed circumference is preformed. This is achieved by making the circumference of the rings 28 and 36 about 8-15% longer than the groove into which it is to be inserted.”

Claim 20, and its respective claims, are patentable not only for their respective dependencies to an allowable independent claim but also for the addition subject matter recited therein.

6. **GROUND OF REJECTIONS TO BE REVIEWED ON APPEAL**

First Ground of Rejection: Appellants respectfully request that the Board review and reverse the Examiner's first ground of rejection, in which claims 19 and 27 were rejected under 35 U.S.C. § 102(b) as anticipated by the Kilmoyer reference (U.S. Patent No. 4,553,759; hereinafter "Kilmoyer").

Second Ground of Rejection: Appellants respectfully request that the Board review and reverse the Examiner's second ground of rejection, in which claims 20-22 were rejected under 35 U.S.C. § 103(a) as obvious in view of Kilmoyer.

Third Ground of Rejection: Appellants respectfully request that the Board review and reverse the Examiner's third ground of rejection, in which claims 5-8, 12-16, and 26 were rejected under 35 U.S.C. § 103(a) as obvious in view of Kilmoyer, the Vanderford et al. reference (U.S. Patent No. 4,381,114; hereinafter "Vanderford") the McEver et al. reference (U.S. Patent No. 4,496,162; hereinafter "McEver").

Fourth Ground of Rejection: Appellants respectfully request that the Board review and reverse the Examiner's fourth ground of rejection, in which claims 19-22 were rejected under 35 U.S.C. § 103(a) as obvious in view of Kilmoyer and McEver.

Fifth Ground of Rejection: Appellants respectfully request that the Board review and reverse the Examiner's fifth ground of rejection, in which claims 23-25 were rejected under 35 U.S.C. § 103(a) as obvious in view of McEver, Kilmoyer, and Vanderford.

Sixth Ground of Rejection: Appellants respectfully request that the Board review and reverse the Examiner's sixth ground of rejection, in which claim 28 was rejected under 35 U.S.C. § 103(a) as obvious in view of McEver, Kilmoyer, Vanderford, and the Taylor reference (U.S. Patent No. 3,869,132; hereinafter "Taylor").

Seventh Ground of Rejection: Appellants respectfully request that the Board review and reverse the Examiner's seventh ground of rejection, in which claim 5 was

rejected under 35 U.S.C. § 112 because the recitation “said opposed ends” allegedly lacked antecedent basis.

7. **ARGUMENT**

As discussed in detail below, Appellants respectfully assert that the claims of the present patent application are patentable and in condition for allowance. For example, Kilmoyer does not disclose a seal ring that places as net force on the body on which it resides. Rather, Kilmoyer, in contrast to the Examiner’s interpretation, does the opposite, and discloses an assembly in which the seal body places an outward bias on the rings 46 and 48, and is silent with respect to any bias provided by the rings. This difference prevents Kilmoyer from supporting a rejection of any number of the pending claims, as described below.

A. First Ground of Rejection

In the last Office Action, claims 19 and 27 were rejected under 35 U.S.C. § 102(b) as anticipated by Kilmoyer. Specifically, the Examiner stated as follows:

Kilmoyer discloses a ...seal assembly having an annularly shaded [*sic*] body having an upper (end near 82) and a lower end (end 74) and a longitudinal axis, the body comprises at least one first ring in a first groove (ring 80 in groove 86), the circumference of the first ring differs from the circumference of the first groove (the circumference of ring 80 differs then the circumference of the groove 86) so as to [*sic*] to apply a net radial force to the body in a direction substantially perpendicular to the longitudinal axis and the circumference of the first ring is greater than the circumference of the groove (the ring 80 has a circumference that is greater than the circumference of the groove as seen in figure 3).

The limitation that the first circumference of the first ring at a location nearest the circumference of the first groove differs before mounting is not persuasive because this is considered a method limitation. Furthermore the first ring 46 has a circumference which that is contract to an amount so as to be placed in a groove 56.

Last Office Action mailed January 19, 2007, p. 3-4.

i. Legal Precedent

Appellants, however, respectfully traverse the rejection, because Kilmoyer does not disclose all of the features recited in the pending claims.

Anticipation under 102 can be found only if a single reference shows exactly what is claimed. See *Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under 102, every element of the claimed invention must be identically shown in a single reference. See *In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). Moreover, the prior art reference also must show the identical invention “in as complete detail as contained in the ... claim” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Additionally, for anticipation, the cited reference must not only disclose all of the recited features but must also disclose the part-to-part relationships between these features. See *Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 486 (Fed. Cir. 1984). Accordingly, Appellants need only point to a single element or claimed relationship not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter. In summary, a strict correspondence between the claimed language and the cited reference must be established for a valid anticipation rejection.

Furthermore, Appellants respectfully submit to the Board that, during patent examination, the pending claims must be given an interpretation that is reasonable and consistent with the specification. See *In re Prater*, 162 U.S.P.Q. 541, 550-551 (C.C.P.A. 1969); *In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); see also M.P.E.P. § 2111 (describing the standards for claim interpretation during prosecution). Interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. See *In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); see also M.P.E.P. § 2111. That is, recitations of a claim must be read as they would be interpreted by those of ordinary skill in the art. See *Rexnord Corp. v. Laliram Corp.*, 60 U.S.P.Q.2d 1851, 1854 (Fed. Cir. 2001); see also M.P.E.P. § 2111. In summary, an Examiner, during prosecution, must interpret a claim recitation as one of ordinary skill in the art would reasonably interpret the

claim in view of the specification. *See In re American Academy of Science Tech Center*, 70 U.S.P.Q.2d 1827 (Fed. Cir. 2004).

Keeping the foregoing in mind, Appellants respectfully assert that the instant claims are not anticipated by the cited reference and, as such, are patentable and in condition for allowance.

ii. Independent Claim 19

As an example of a missing claim limitation, Kilmoyer does not disclose a first ring and a first groove where the circumference of the first ring at a location nearest the bottom of the first groove differs before mounting “so as to apply a net radial force to said body in a direction substantially perpendicular to said longitudinal axis” as recited in claim 19. Rather, Kilmoyer discloses a first ring in a first groove wherein the first ring has a greater cross-sectional area than the groove in which it rests. Although Kilmoyer does show a ring 46 resting in a groove 56, neither the specification nor the claims ever mention a circumferential relationship between the ring and the groove much less a relationship resulting in a net radial force applied to the annular seal body. Thus, the seal assembly 40 of Kilmoyer does not meet the legal standard of anticipation because it fails to disclose a seal assembly having the exact structure recited in claim 19.

The Examiner, however, asserts that Kilmoyer does anticipate claim 19 based on his interpretations of Kilmoyer figures 2 and 3. Appellants respectfully disagree with the Examiner’s interpretation and submit that his interpretation is not supported by the reference itself. In fact, the Examiner’s interpretation is speculative and, thus, not sufficient to support a *prima facie* case of anticipation. Kilmoyer does not inherently anticipate the circumferential relationship between the ring and the groove because such a relationship is not “necessarily present” when one practices Kilmoyer. *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). That is to say, because Kilmoyer functions based on the outward radial force applied to the soft seal ring by the load ring 44, Kilmoyer could, and most likely does, function just as well if the soft seal rings sat *loosely* in the groove prior

to insertion of the load ring insertion, thus providing no force. Moreover, the use of “soft” seal rings 44 and 46 suggests the seal ring are not capable of providing a net force to the seal body 40. Because Kilmoyer neither directly nor inherently anticipates the circumferential relationship, the seal assembly of Kilmoyer lacks the structural correspondence necessary to anticipate the seal assembly of claim 19.

Appellants additionally submit that the “before mounting” limitation is, in fact, a structural limitation. Specifically, the “before mounting” limitation is a structural limitation because it describes a physical characteristic of the first ring. The limitation describes a structure wherein a first ring disposed on the inner face of the seal assembly has a circumference greater than the bottom of the first groove and a first ring disposed on the outer face of the seal assembly has a circumference smaller than the bottom of the first groove so as to exert a radial force into the annular seal body, for example. Additionally, Appellants assert that Kilmoyer does not disclose this “before mounting” limitation. Assuming, *arguendo*, the Examiner’s assertion that the ring of Kilmoyer must be compressed to be inserted were true, the ring in Kilmoyer would not anticipate a circumferential relationship which differs before mounting so as to *exert a radial force* into the seal body because the Kilmoyer ring could be compressed to be inserted and not contact the groove bottom once installed. Therefore, because the “before mounting” element is a structural limitation and Kilmoyer does not disclose such an element, Appellants respectfully submit that this claim limitation must be given patentable weight and is not found in Kilmoyer.

Additionally, Kilmoyer focuses on a seal assembly that functions by a radial force applied outwardly from the annular seal body to the seal rings 46 and 48 resting therein. Specifically, Kilmoyer relies on a load ring 44 inserted into a large internal gap to provide an outwardly radial biasing force on the body in which seal rings 46 and 48 reside. *See* Kilmoyer, col. 3, ll. 28-30. Thus, Kilmoyer relies on an outward force applied from inside the annular seal body. On the other hand, claim 19 recites that a radial force *applied onto* the annular seal body by the rings and is completely antithetical to the assembly described in Kilmoyer. Thus, Kilmoyer not only fails to disclose the claimed limitation but, in fact,

teaches the exact opposite. Indeed, the use of “soft” seal rings by Kilmoyer only buttresses Appellants’ contention that Kilmoyer does not disclose seal rings that apply a net force to the body in which they reside. *See id.* at col. 3, ll. 5-20. Therefore, Kilmoyer does not anticipate claim 19.

Based on the foregoing, Appellants respectfully assert that Kilmoyer does not anticipate independent claim 19. Thus, Appellants respectfully request that the Board reverse the Examiner’s rejection of claim 19, and direct the Examiner to allow this claim.

ii. Dependant Claim 27

Regarding dependant claim 27, Appellants respectfully assert that Kilmoyer does not anticipate claim 27 because Kilmoyer does not anticipate independent claim 19. As stated previously, Examiner rejected claim 19 under 102(b) as anticipated by Kilmoyer. However, Examiner failed to establish a *prima facie* case of anticipation because the cited reference did not show each and every recited feature and structural relationship. Accordingly, Appellants respectfully assert that claim 27 cannot be anticipated because independent claim 19, the claim from which claim 27 depends, is not anticipated. Thus, Appellants respectfully submit that dependant claim 27 is patentable at least as a result of its dependence on claim 19. In view of the foregoing, Appellants respectfully request the Board direct the examiner to withdraw the rejection of claim 27 in view of Kilmoyer and direct the Examiner to allow this claim.

B. Second Ground of Rejection

In the last Office Action, claims 20-22 were rejected under 35 U.S.C. § 103(a) as obvious in view of Kilmoyer. Specifically, the Examiner stated as follows:

Kilmoyer discloses the claimed invention except that the first ring circumference is 8-15% different from the first groove in which it is installed. Discovering an optimum range of a result effective variable involves only routine skill in the art.

...

Regarding to the limitations “when the body is installed in the annular gap, is in an interference fit with the one of the first and second bodies to an exten[t] of at least about 20% of the

cross-sectional diameter of the second ring” is considered to be intended use and the second ring of Kilmoyer is capable of being in an interference fit of 20% with respect [to] another body.”

Last Office Action mailed January 19, 2007, p. 4-5

i. Legal Precedent

Appellants respectfully traverse the rejection and submit that the Examiner has not presented a *prima facie* case of obviousness. The Examiner bears the burden of establishing a *prima facie* case of obviousness. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). To establish a *prima facie* case, the Examiner must not only show that the combination or modification includes *all* of the claimed elements, but also a convincing line of reasoning as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of references. *See Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985).

Regarding the requirement of a convincing line of reasoning in addressing obviousness determinations under 35 U.S.C. § 103, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, No. 04-1350 (April 30, 2007), reaffirmed many of its precedents relating to obviousness including its holding in *Graham v. John Deere Co.*, 383 U.S. 1 (1966). In *Graham*, the Court set out an objective analysis for applying the statutory language of §103:

Under §103, the scope and content of the prior art are to be determined, differences between the prior art and the claims at issue are to be ascertained, and the level of ordinary skill in the pertinent art are to be resolved. Against this background the obviousness or non-obviousness of the subject matter is to be determined. Such secondary considerations as commercial success, long-felt but unresolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. *KSR, slip op.* at 2 (citing *Graham*, 383 U.S. at 17-18).

In *KSR*, the Court also reaffirmed that “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in

the prior art.” *Id.* at 14. In this regard, the *KSR* court stated that “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does ... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *Id.* at 14-15. Traditionally, to establish a *prima facie* case of obviousness, the CCPA and the Federal Circuit have required that the prior art not only include all of the claimed elements, but also some teaching, suggestion, or motivation to combine the known elements in the same manner set forth in the claim at issue. See, e.g., *ASC Hospital Systems Inc. v. Montifiore Hospital*, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984) (holding that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination.); *In re Mills*, 16 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 1990) (holding that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination). In *KSR*, the court noted that the demonstration of a teaching, suggestion, or motivation to combine provides a “helpful insight” in determining whether claimed subject matter is obvious. *KSR, slip op.* at 14. However, the court rejected a *rigid* application of the “TSM” test. *Id.* at 11. In this regard, the court stated:

The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and explicit content of issued patents. The diversity of inventive pursuit and of modern technology counsels against limiting the analysis in this way. In many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature, will drive design trends. *Id.* at 15.

In other words, the *KSR* court rejected a rigid application of the TSM test which requires that a teaching, suggestion or motivation to combine elements in a particular manner must be explicitly found in the cited prior art. Instead, the *KSR* court favored a more expansive view of

the sources of evidence that may be considered in determining an apparent reason to combine known elements by stating:

Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art all in order to determine whether there was an apparent reason to combine in the known elements in the fashion claimed in the patent at issue. *Id.* at 14.

The *KSR* court also noted that there is not necessarily an inconsistency between the idea underlying the TSM test and the *Graham* analysis, and it further stated that the broader application of the TSM test found in certain Federal Circuit decisions appears to be consistent with *Graham*. *Id.* at 17-18 (citing *DyStar Textilfarben GmbH and Co. v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (2006) (“Our suggestion test is in actuality quite flexible and not only permits but *requires* consideration of common knowledge and common sense”); *Alza Corp. v. Mylan Labs, Inc.*, 464 F.3d 1286, 1291 (2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires a teaching to combine ... “)).

Furthermore, the *KSR* court did not diminish the requirement for objective evidence of obviousness. *Id.* at 14 (“To facilitate review, this analysis should be made explicit. See *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”); see also, *In re Lee*, 61 U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002) (holding that the factual inquiry whether to combine references must be thorough and searching, and that it must be based on *objective evidence of record*).

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). The Federal Circuit has warned that the Examiner must not, “fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.” *In re Dembiczak*, F.3d 994, 999, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983)).

It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983); M.P.E.P. § 2145. Moreover, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959); *see* M.P.E.P. § 2143.01(VI). If the proposed modification or combination would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984); *see* M.P.E.P. § 2143.01(V).

ii. Dependant Claims 20-22

With regard to dependant claims 20-22, Appellants respectfully assert that dependant claims 20-22 are not obvious in view of Kilmoyer because Kilmoyer does not disclose all claimed limitations, and a clear line of reasoning as to why the claimed invention would have been obvious to one with ordinary skill in the art has not been provided. As previously mentioned, Kilmoyer does not disclose the circumferential relationship between a first ring and a first groove as disclosed in claim 19. Accordingly, discovering optimum values, as the Examiner alleges, for the ring and groove structures in independent claim 19 would not have

been obvious in light of Kilmoyer because there would have been no reason to determine optimum values for an undisclosed feature. Indeed, the M.P.E.P., relying on long-standing legal precedent, recognizes that “[a] particular parameter must first be recognized as a result-effective variable, i.e., a variable which receives a recognized result, before the determination of the optimum workable ranges of said variable might be characterized as routine experimentation.” Thus, Appellants respectfully assert that dependant claims 20-22 cannot be rejected as obvious in light of Kilmoyer because Kilmoyer does not disclose the first ring/first groove circumferential relationship and as a result does not provide motivation to determine optimum values for variables not yet recognized.

Consequently, Appellants respectfully assert that Kilmoyer does not support a *prima facie* case of obvious with respect to dependant claims 20-22. With the foregoing in mind, appellants respectfully request that the Board withdraw the rejection of claims 20-22 and direct the Examiner to allow these claims.

iii. Dependant Claim 21

Focusing on dependant claim 21, Appellants respectfully submit that the interference fit limitation is in fact a structural relationship described in terms of function rather than an intended use or method limitation as argued by the Examiner. One of ordinary skill in the art would realize that a ring configured to maintain a 20% interference fit once installed in an annular gap requires certain structural characteristics. As such, Appellants respectfully suggest the 20% interference fit limitation describes the structure of the second ring in terms of its function and not in terms of intended use or method. It is well settled law that an “applicant is free to recite features of an apparatus either structurally or functionally.” *In re Swinehart*, 439 F.2d 210, 212 (CCPA 1971). Consequently, Appellants respectfully request that the Board deny the intended use rejection and direct the Examiner to allow claim 21.

C. Third Ground for Rejection

In the last Office Action, claims 5-8, 12-16, and 26 were rejected under 35 U.S.C. § 103(a) as obvious in view of Kilmoyer, Vanderford, and McEver. Specifically, the Examiner stated as follows:

The limitation that the backup ring must be compressed to be inserted in the annular gap is considered to be method limitation and is given little patentable weight.

McEver discloses the invention substantially as claimed above but fails to disclose that the backup ring further comprising a bend between the ends of the backup ring. Vanderford discloses a seal body having ends and the ends having backup rings with ends (figure 4, seal 64', having ends with backup rings having ends 86', 84', 90' and 92') and a seal body having ends (fig. 5, 100), the ends of the seal having backup rings having ends (fig. 5 backup rings having ends 110 and 107) and a bend (112) between the ends of the backup rings (fig. 5, 112 is between the ends of the backup rings). It would have been obvious to one having ordinary skill in the art at the time the invention was made to configure the backup rings of McEver to have a bend between the ends as taught by Vanderford, to provide additional strength (column 3, lines 67-68 of Vanderford).

....

Regarding the limitations that the bend between the opposed ends to store a force created by insertion of the backup ring into the annular space and apply a force on the opposed ends against the first and second bodies is given little patentable weight, since this limitations are considered to be method limitation.

McEver and Vanderford disclose the invention substantially as claimed above but fail to disclose that the body comprises at least one first ring in a first groove...Kilmoyer discloses a seal ring having a first groove (56), the first groove having a ring (48), a second groove (58) having a second ring (46), the circumference (outer circumference of the first ring 48) of the first ring exceeds the circumference of the first groove (the circumference of a bottom of the first groove and furthermore the first ring projects beyond the groove depth), the circumference of the second ring (inner circumference of the second ring) is shorter than the circumference of the second groove...It would

have been obvious...to configure the annular body of McEver and Vanderford to have first and second grooves to have first and second rings...as taught by Kilmoyer to provide a seal at low temperatures.

The limitation that the first circumference of the first ring at a location nearest the first circumference of the first groove differs before mounting is not persuasive because this is considered to be a method limitation.

Last Office Action mailed January 19, 2007, p. 7-8

i. Independent Claim 5

Beginning with independent claim 5, Appellants respectfully assert that the cited references, taken alone or together, do not disclose all of the features recited in this claim. As an example of a missing claim limitation, the combination does not disclose the first ring/first groove circumferential relationship designed to apply a net radial force into the annular seal body as recited in claim 5. In establishing a *prima facie* case of obviousness, the Examiner relies on Kilmoyer to establish the circumferential relationship between the first ring and the first groove on the annular seal body. As previously mentioned, though, Kilmoyer fails to disclose a circumferential relationship wherein the first ring applies a net radial force into the annular seal body. Thus, a *prima facie* case is not established.

Furthermore, Appellants respectfully assert that Kilmoyer teaches away from the subject matter of the instant claims. The Federal Circuit has consistently held that a reference that teaches away from the claimed invention cannot serve to create a *prima facie* case of obviousness. See *In re Gurley*, 31 U.S.P.Q.2d 1130, 1132 (Fed. Cir. 1994) (noting that it is a useful general rule that “a reference that ‘teaches away’ can not server to create a *prima facie* case of obviousness”). Moreover, a reference must be considered in its entirety, including portions that would lead away from the claimed invention. See M.P.E.P. § 2142.02. Indeed, “[i]t is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it that will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.” *In re Wesslau*, 147 U.S.P.Q. 391, 393 (C.C.P.A. 1965).

With this in mind, Appellants respectfully assert that Kilmoyer teaches away from the claimed net radial force applied to the annular seal body recited in claim 5. As previously mentioned, Kilmoyer teaches that a load ring (44) apply a net outward radial force to the annular seal body and the soft seal rings. *See* Kilmoyer, col. 3, ll. 27-30 (stating that the load ring is preferably metal to remain rigid and allow a “differential expansion of seal ring 42”). In contrast, the seal assembly in the instant claim requires a radial force be applied by the seal rings to the body. Clearly, when taken as a whole, Kilmoyer teaches away from the instant claim and thus does not establish a *prima facie* case of obviousness.

In response to the first so-called method limitation rejection, Appellants respectfully submit that the limitation wherein the backup ring must be compressed to be inserted into an annular gap is, in fact, a structural limitation. A limitation that requires the backup ring be compressed to be inserted into an annular gap speaks specifically to the uncompressed width of the backup ring. Infringement of this limitation lies not with insertion of the backup ring in an annular gap. Instead, infringement lies when a backup ring is made with an uncompressed width so that it must be compressed to be inserted into an annular gap. Thus, Appellants respectfully suggest that the compression limitation is in fact an allowable structural limitation that must be given patentable weight.

The Examiner also asserts that the backup ring limitation wherein the back up ring comprises “a bend between said opposed ends to store a force created by insertion of said backup ring into the annular space” as disclosed in claim 5 is a method limitation and thus is given little patentable weight. In fact, the claim element recites a functional limitation of the bend between the opposed ends and not a method limitation because the limitation describes the structural characteristics of the bend in terms of the function it is configured to serve. One of ordinary skill in the art would recognize that a bend on a backup ring configured to store a force upon insertion into an annular gap requires certain characteristics. Moreover, a bend configured to store a force upon insertion into an annular space remains so even if the seal assembly is not installed in an annular space. Thus, Appellants respectfully assert that

the backup ring bend limitation is an allowable structural limitation stated in terms of function and must be given patentable weight.

In addition, the Examiner argues that the “before mounting” circumferential limitation disclosed in claim 5 is a method limitation. Because the limitation in claim 5 and in claim 19 share identical language, Appellants direct the Board’s attention to the argument from Appellant’s Brief in support of independent claim 19 stating that the “before mounting” limitation is actually a structural limitation and thus should be given patentable weight.

Accordingly, Appellants respectfully assert that Kilmoyer, McEver, and Vanderford do not support a *prima facie* case of obviousness with respect to independent claim 5 and its respective dependant claims 6-8, 12-16, and 26. With the foregoing in mind, Appellants respectfully request that the Board withdraw the rejection of claims 5-8, 12-16 and 26 and direct the Examiner to allow these claims.

ii. Dependant Claims 6 and 16

In response to Examiner’s arguments, Appellants respectfully assert that the deformation limitation language in dependant claims 6 and 16 are, in fact, structural limitations stated in terms of function and are not intended use or method limitations. The limitation does not define the invention in terms of actual insertion into an annular gap. Instead, the limitation describes the structure of the first ring in terms of the function it is configured to accomplish. In other words, one of ordinary skill in the art would recognize certain characteristics that must exist in a first ring configured to deform when inserted into an annular gap so as to force the backup ring ends apart. Thus, Appellants respectfully assert that dependant claims 6 and 16 are patentable and in condition for allowance.

iii. Dependant Claim 7

Appellants traverse the rejection of dependant claim 7 because Examiner fails to establish a *prima facie* case of obviousness or a clear line of reasoning as to why the claimed invention would have been obvious to one with ordinary skill in the art. As previously argued

in defense of claims 20-22, it would not have been obvious to a person of ordinary skill in the art to select optimum values for a nonexistent feature of the stated combination. As such, Appellants respectfully request that the Board reject the obviousness argument and direct the Examiner to allow claim 7.

iv. Dependant Claim 12

In support of dependant claim 12, Appellants respectfully direct the Board's attention to the arguments in support of claim 21 from the second ground of rejection. Although claim 12 talks about the first ring instead of the second ring, the 20% interference fit limitation remains a structural limitation stated in terms of function and not an intended use limitation. Consequently, the limitation should be given patentable weight because functional limitations are allowable.

v. Dependant Claims 14 and 15

In response to Examiner's obviousness rejection of dependant claims 14 and 15, Appellants respectfully suggest that Examiner failed to establish a *prima facie* case of obviousness in rejecting independent claim 5 and therefore any claims directly or indirectly dependant upon claim 5 should be allowable. Moreover, as previously mentioned, it is not obvious to discover optimum values for structural components or relationships not found in the stated combination. Thus, Appellants respectfully suggest that claims 14 and 15 are patentable and in condition for allowance.

vi. Dependant Claim 16

Regarding dependant claim 16, Appellants respectfully argue that the wave deformation in the axial direction of the first ring is not obvious in view of Kilmoyer because the deformation results from a circumferential relationship between a first ring and a first groove not disclosed in the stated combination. Referring to the arguments in support of claim 5, Appellants again respectfully assert that Kilmoyer not only fails to disclose the circumferential relationship but instead teaches away from a circumferential relationship that applies a net radial force into the annular seal body. Because Kilmoyer does not disclose the

circumferential relationship, a structural characteristic arising from the circumferential relationship is similarly not disclosed. As a result, Appellants respectfully request the Board withdraw the obvious rejection to claim 16 and direct the Examiner to allow the claim.

D. Fourth Ground of Rejection

In the last Office Action, claims 19-22 were rejected under 35 U.S.C. § 103(a) as obvious in view of McEver and Kilmoyer. Specifically, the Examiner states:

McEver discloses the invention substantially as claimed but fail to disclose that the body comprises at least one first ring in a first groove, the first groove having a bottom and a first circumference at the bottom, the circumference of the first ring at a location nearest the first circumference of the first groove differs from mounting from the first circumference of the first groove...Kilmoyer discloses a seal ring having a first groove, the first groove having a first ring...the circumference of the first ring exceeds the circumference of the first groove. It would have been obvious...to configure the annular body of McEver to have first and second grooves to have first and second rings, the circumference of the first ring exceeds the circumference of the first groove, the circumference of the second ring is shorter than the circumference of the second groove...as taught by Kilmoyer.

The limitation that the first circumference of the first ring at a location nearest the first circumference of the first groove differs before mounting is not persuasive because this is considered to be a method limitation. Furthermore Kilmoyer teaches that the first ring 46 has a circumference that is contracted to an amount so as to be placed in groove 56.

....

Regarding the limitations "when the body is installed in the annular gap, is in an interference fit with one of the first and second bodies to an extend [*sic*] of at least about 20% of the cross-sectional diameter of the second ring" is considered to be intended use and the seal assembly of McEver et al and Kilmoyer is capable of being in an interference fit of 20% with respect with another body.

Last Office Action mailed January 19, 2007, p. 10-12 (internal parentheticals omitted.)

i. Claims 19-22

Appellants respectfully assert that the Examiner failed to establish a *prima facie* case of obviousness because the cited references, taken alone or together, do not disclose all of the features recited in this claim. As an example of a missing claim element, the combination does not disclose the first ring/first groove circumferential relationship designed to apply a net radial force into the annular seal body as disclosed in claim 19. Examiner admits that McEver fails to disclose a first ring and first groove as stated in claim 19. *See* Office Action mailed January 19, 2007, p. 10. The Examiner then relies on Kilmoyer to establish the circumferential relationship between the first ring and the first groove on the annular seal body. As previously argued, though, Kilmoyer fails to disclose a circumferential relationship wherein the first ring applies a net radial force into the annular seal body. Thus, a *prima facie* case is not established and the rejection inappropriate because the stated combination does not disclose all recited claim features.

In addition, Appellants respectfully direct the Board to the argument in support of claim 5 in the previous section and submit that Kilmoyer teaches away from the instant claim. While Kilmoyer does disclose a ring and a groove, it does not teach use of the ring and the groove to apply a net radial force into the annular seal body. In fact, Kilmoyer teaches the opposite- utilizing an outward radial force caused by insertion of a load ring. Because Kilmoyer teaches away from the claimed invention, Appellants respectfully submit that Examiner failed to establish a *prima facie* case of obviousness.

In response to Examiner's argument that the "before mounting" circumferential limitation disclosed in claim 19 is a method limitation, Appellants respectfully direct the Board's attention to the argument in support of claim 19 from anticipation by Kilmoyer and submit again that the "before mounting" limitation is in fact an allowable functional limitation.

Likewise, Appellants respectfully submit that the 20% interference fit limitation recited in dependant claim 21 is in fact an allowable structural limitation stated in terms of

function and call attention to the more in depth arguments presented previously in support of claim 21 from the second ground of rejection.

Accordingly, Appellants respectfully assert that Kilmoyer and McEver do not support a *prima facie* case of obviousness with respect to independent claim 19 and its respective dependant claims 20-22. With the foregoing in mind, Appellants respectfully request that the Board withdraw the rejection of claims 19-22 and direct the Examiner to allow these claims.

E. Fifth Ground of Rejection

In the last Office Action, claims 23-25 were rejected under 35 U.S.C. § 103(a) as obvious in view of McEver, Kilmoyer, and Vanderford. Specifically, the Examiner states:

McEver and Kilmoyer disclose the invention substantially as claimed above but fail to disclose that the backup ring further comprising a bend between the ends of the backup rings to store a force. Vanderford discloses a seal body having ends and the ends having backup rings with ends and a seal body having ends, the ends of the seal having backup rings having ends and a bend between the ends of the backup ring. It would have been obvious to one having ordinary skill in the art at the time the invention was made to configure the backup rings of McEver to have a bend between the ends of the backup rings as taught by Vanderford, to provide additional strength.

Last Office Action mailed January 19, 2007, p. 12 (internal parentheticals omitted.)

In response to the Examiner's contentions, Appellants respectfully assert that Examiner failed to establish a *prima facie* case of obviousness in rejecting independent claim 19 and thus claims 23-25 should be allowable due to their dependence on claim 19. Likewise, the additional cited reference, Vanderford, addresses backup rings and does not speak to the deficiency in the obviousness rejection of claim 19; namely, that the stated combination does not disclose the first ring/first groove circumferential relationship. Accordingly, Appellants respectfully assert that McEver, Kilmoyer, and Vanderford do not support a *prima facie* case of obviousness with respect to dependant claims 23-25. Thus,

Appellants respectfully request that the Board withdraw the rejection of dependant claims 23-25 and direct the Examiner to allow this claim.

i. Dependant Claims 24 and 25

Appellants respectfully assert that the deformation limitations disclosed in dependant claims 24 and 25 are patentable because the Examiner failed to establish a *prima facie* case of obviousness in regards to both independent claim 19 and any dependant claim arising therefrom. The Examiner claims that the deformation of the seal ring once inserted into an annular gap arises from the circumferential relationship between the first ring and the first groove disclosed in Kilmoyer. *See* Office Action mailed January 19, 2007, p. 12. However, as previously asserted, Kilmoyer fails to disclosed such a circumferential relationship. As such, Appellants respectfully submit that any limitations that arise from an undisclosed limitation should be patentable.

Furthermore, Appellants respectfully submit that the deformation limitations are structural limitations stated in terms of function and not intended use limitations as argued by the Examiner. The deformation arises directly from the circumferential difference between the first groove and the first ring and the resultant radial force into the seal body. Thus, the limitation does not require installation of the seal assembly into an annular gap, but instead requires a seal ring configured to deform into a wave pattern once installed into an annular gap. Appellant respectfully assert, as a result, that dependant claims 24 and 25 should be patentable because they are allowable functional limitations.

F. Sixth Ground of Rejection

In the last Office Action, claim 28 was rejected under 35 U.S.C. § 103(a) as obvious in view of McEver, Kilmoyer, Vanderford, and Taylor. Specifically, the Examiner states:

McEver discloses a seal assembly for closing off an annular space between first and second bodies and supported by at least one of the first and second bodies...

The limitation that the backup ring must be compressed to be inserted in the annular gap is considered to be a method limitation and is given little patentable weight...

McEver discloses the invention substantially as claimed above but fails to disclose that the backup ring further comprising a bend between the ends to store a force. Vanderford discloses a seal body having ends and the ends having backup rings with...a bend between the ends of the backup rings. It would have been obvious... to configure the backup rings of McEver to have a bend between the ends of the backup rings as taught by Vanderford...

McEver and Vanderford disclose the invention substantially as claimed above but fails to disclose that the ends of the backup rings loop toward each other to create a gripping engagement with the body under residual force upon initial mounting to the body (intended use). Taylor teaches to use an E-shaped member having ends that loop toward each other...It would have been obvious...to combine the ends of the back up ring of McEver and Vanderford to have loop ends as taught by Taylor...

McEver, Vanderford, and Taylor disclose the invention substantially as claimed above but fail to disclose that the body comprises at least on first ring in a first groove...Kilmoyer discloses a seal ring having a first groove, the first groove having a ring, a second groove having a ring, the circumference of the first ring exceeds the circumference of the first groove...It would have been obvious...to configure the annular body of McEver, Vanderford, and Taylor to have first and second grooves to have first and a second rings, the circumference of the first ring exceeds the circumference of the first groove, the circumference of the second ring is shorter than the circumference of the second groove...as taught by Kilmoyer to provide a seal at low temperatures.

The limitation that the first circumference of the first ring at a location nearest the first circumference of the first groove differs before mounting is not persuasive because this is considered a method limitation.

i. Independent Claim 28

Regarding independent claim 28, Appellants respectfully submit that the Examiner failed to establish *prima facie* case of obviousness because the stated combination fails to disclose all features recited in the claim. Specifically, the stated combination fails to disclose a sealing ring disposed in a notched portion of the annular body and configured to provide a biasing force in a radially inward direction. Recalling the arguments against anticipation of claim 19 by Kilmoyer, Appellants submit that Kilmoyer does not disclose a circumferential difference between the sealing ring and the notched portion of the seal body that provides a biasing force in a radially inward direction. Instead, Kilmoyer discloses soft seal rings which function based upon their greater cross sectional area than the groove and their contact with the annular gap walls. Thus, Examiner fails to establish a *prima facie* case of obviousness because the stated combination does not disclose a sealing ring configured to provide a biasing force in a radially inward direction.

Moreover, Appellants respectfully assert that Examiner failed to establish a *prima facie* case of obviousness because Kilmoyer teaches away from the instant claim. Kilmoyer relies on an outward biasing force caused by insertion of a load ring into the seal body. In relying on Kilmoyer to disclose the first ring and first groove, Examiner did not take the entire reference into account, instead choosing to rely only on the portion of the reference teaching use of a first ring and a first groove. As previously stated, the entire reference must be taken into account when establishing an obviousness rejection. See *In re Wesslau*, 147 U.S.P.Q. 391, 393 (C.C.P.A. 1965). Thus, Appellants assert that Examiner failed to establish a *prima facie* case of obviousness because Kilmoyer, when viewed in its entirety, teaches away from instant claim.

In response to Examiner's method limitation argument with regard to the backup ring compression limitation, Appellant respectfully assert that the argument is inapplicable because claim 28 does not include the backup ring compression limitation.

Appellants further respectfully submit that Examiner's "before mounting" method limitation argument is inapplicable because claim 28 does not include the "before mounting" limitation language.

Accordingly, Appellants respectfully assert that McEver, Kilmoyer, Vanderford, and Taylor do not support a prima facie case of obviousness with respect to independent claim 28. Thus, Appellants respectfully request that the Board withdraw the rejection of independent claim 28 and direct the examiner to allow this claim.

G. Seventh Ground of Rejection

In the last Office Action, the Examiner rejected claim 5 under 35 U.S.C. § 112 because the claim limitation "said opposed ends" allegedly lacked antecedent basis. Appellants respectfully traverse the rejection. Claim 5 recites that "*opposed ends* on the backup rings must be compressed to be inserted in the annular space" prior to the recitation in question. (Emphasis added.) Accordingly, Appellants respectfully submit that the later recitation of "said opposed ends" has antecedent basis. Therefore, Appellants respectfully request that the Board reverse the Examiner's rejection and direct allowance of this claim.

CONCLUSION

If the Examiner of the Board believes that a telephonic interview would assist in the prosecution of the present application to allowance, such an interview with the undersigned is sincerely invited.

Respectfully submitted,

Date: February 29, 2008

/Manish Vyas/

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8. **APPENDIX OF CLAIMS ON APPEAL**

1-4. (Cancelled).

5. (Previously presented) A seal assembly for closing off an annular space between a first and second body and supported by at least one of said first and second bodies, comprising:

an annularly shaped body having an upper and a lower end and a longitudinal axis;
and

at least one backup ring mounted on one of said ends of said body and having a relaxed dimension greater than the annular space between said first and second bodies so that opposed ends on said backup ring must be compressed to be inserted in the annular space, said backup ring further comprising a bend between said opposed ends to store a force created by insertion of said backup ring into the annular space and apply said force on said opposed ends against said first and second bodies;

said body comprises at least one first ring in a first groove, said first groove having a bottom and a first circumference at said bottom;

the circumference of said first ring at a location nearest said first circumference of said first groove differs before mounting from said first circumference of said first groove so as to apply a net radial force to said body in a direction substantially perpendicular to said longitudinal axis.

6. (Previously presented) The assembly of claim 5, wherein:
said first ring, when placed in contact with one of said first and second bodies, deforms said first groove to force said ends of said backup ring away from each other.

7. (Previously presented) The assembly of claim 5, wherein:
said first ring circumference is in the range of at least about 8-15% different from said groove in which it is installed.

8. (Original) The assembly of claim 5, wherein:
said first ring is made from a material having a Durometer hardness of about 56-85.

9-11. (Cancelled)

12. (Previously presented) The assembly of claim **5**, wherein:

said first ring contacts the one of said first and second bodies with the larger dimension;

said first ring, when said body is installed in the annular space, is in an interference fit with said one of said first and second bodies to an extent of at least about 20% of the cross-sectional diameter of said first ring.

13. (Original) The assembly of claim **12**, wherein:

said first ring is made from a material having a Durometer hardness of about 56-85.

14. (Previously presented) The assembly of claim **5**, wherein:

said body further comprises at least one second ring in a second groove disposed on the opposite side of said body from said first ring;

said second ring contacts the one of said first and second bodies with the larger dimension;

said second ring, when said body is installed in the annular space, is in an interference fit with said one of said first and second bodies to an extent of at least about 20% of the cross-sectional diameter of said second ring.

15. (Original) The assembly of claim **14**, wherein:

said first ring is made from a material having a Durometer hardness of about 56-85.

16. (Original) The assembly of claim **6**, wherein:

said body has a longitudinal axis and said deformation results in said first ring deforming into an undulating wave pattern in an axial direction parallel to said longitudinal axis.

17. (Cancelled)

18. (Cancelled).

19. (Previously presented) A seal assembly for closing off an annular space between a first and second body and supported by at least one of said first and second bodies, comprising:

an annularly shaped body having an upper and a lower end and a longitudinal axis;

said body comprises at least one first ring in a first groove, said first groove having a bottom and a first circumference at said bottom;

the circumference of said first ring at a location nearest said first circumference of said first groove differs before mounting from said first circumference of said first groove so as to apply a net radial force to said body in a direction substantially perpendicular to said longitudinal axis.

20. (Previously presented) The assembly of claim **19**, wherein:

said first ring circumference is in the range of at least about 8-15% different from said groove in which it is installed.

21. (Original) The assembly of claim **20**, wherein:

said body further comprises at least one second ring in a second groove disposed on the opposite side of said body from said first ring;

said second ring, when said body is installed in the annular gap, is in an interference fit with said one of said first and second bodies to an extent of at least about 20% of the cross-sectional diameter of said second ring.

22. (Original) The assembly of claim **21**, wherein:

said first and second rings are made from a material having a Durometer hardness of about 56-85.

23. (Original) The assembly of claim **22**, further comprising:

at least one backup ring mounted on one of said ends of said body and having a relaxed dimension greater than the annular gap between said first and second bodies so that opposed ends on said backup ring must be compressed to be inserted in the annular gap, said backup ring further comprising a bend between said opposed ends to store a force created by insertion of said backup ring into the annular space and apply said force on said opposed ends against said first and second bodies.

24. (Original) The assembly of claim **23**, wherein:

said first ring, when placed in contact with one of said first and second bodies, deforms in a manner so as to force said ends of said backup ring away from each other.

25. (Original) The assembly of claim **24**, wherein:

said first ring contacts the one of said first and second bodies with the smaller dimension;

said body has a longitudinal axis and said deformation results in said first ring deforming into an undulating wave pattern in an axial direction parallel to said longitudinal axis.

26. (Previously presented) The assembly of claim **5**, wherein:

said first ring is softer than said body.

27. (Previously presented) The assembly of claim **19**, wherein:

said first ring is softer than said body.

28. (Previously presented) A seal assembly for sealing an annular space between first and second bodies, comprising:

an annularly shaped body having first and second ends, and at least one notched portion disposed between the first and second ends;

at least one backup ring disposed on one of the first or second ends, the backup ring comprising:

a pair of loop ends extending toward the annularly shaped body and configured to secure the backup ring to the annularly shaped body;

an inflected portion located between the loop ends and in abutment with the annularly shaped body, wherein the inflected portion facilitates elastic deformation of the backup ring; and

a sealing ring disposed in the notched portion of the annular body and configured to provide a biasing force in a radially inward direction with respect to the annular body.

9. EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS APPENDIX

None.